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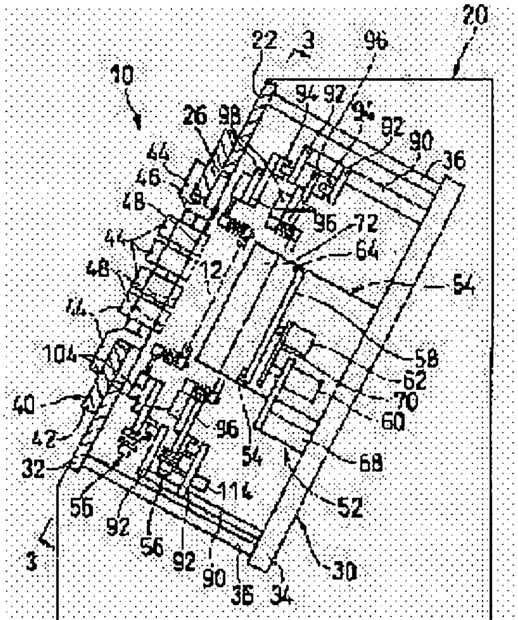
(54) INSPECTION DEVICE FOR LIQUID CRYSTAL PANEL

(57)Abstract:
PROBLEM TO BE SOLVED: To reduce damage to a liquid crystal panel caused by a carrying means and waste of time caused by the moving of the carrying means by reciprocating a moving base and displacing a holder in a direction for its separation from the liquid crystal panel within a surface parallel to the same.
SOLUTION: By rotating a driving source 114 forward, a first slider 96 is moved from a transfer position to an inspecting position by each driving mechanism and, by rotating the driving source 114 backward, the first slider 96 is moved from the inspecting position to the transfer position. Each holder has a recess for receiving the end of a liquid crystal panel, and the holder is supported by a second slider 98 while the recess is placed to face inside by a corresponding second driving mechanism 104. Then, a first carrying mechanism 56 is actuated, and thereby the holder is moved inside (mutual approaching direction) by the second driving mechanism 104. Thus, for a liquid crystal panel 12, its end part of a Y direction is received in the recess of the holder of a first carrier device 56.



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CLAIMS

[Claim(s)]

[Claim 1] Test equipment of a liquid crystal panel characterized by providing the following It has been arranged in the delivery location of a liquid crystal panel, delivers, and is a stage. The inspection stage arranged in the inspection location distant from this delivery stage at least two transport devices which convey a liquid crystal panel to both stages -- containing -- each transport device -- between both stages -- a round trip -- a movable movable carriage The 2nd driving means to which it is the holder of a pair at least, and it gets together in in a field parallel to a liquid crystal panel, and the variation rate of the holder which set spacing to said movable carriage and has been arranged at it at the condition of having the 1st driving means which carries out both-way migration of this movable carriage, and the hollow in which the edge of a liquid crystal panel is accepted and of having made said hollow countering, and this holder is carried out to phase detached building ******

[Claim 2] Said delivery stage is equipped with the panel receptacle which receives a liquid crystal panel, and said inspection stage is equipped with the work table which receives a liquid crystal panel. Each of said panel receptacle and said work table Test equipment according to claim 1 which is the notch formed at least in each part corresponding to the edge of a pair where a liquid crystal panel counters, and has the notch which accepts this a part of holder when the variation rate of them is carried out in the direction almost perpendicular to a liquid crystal panel, and when it is moved in the direction in which said holder gets together.

[Claim 3] It is test equipment according to claim 2 with which said delivery stage and said inspection stage have the displacement means to which the variation rate of said panel receptacle and work table is carried out in the direction almost perpendicular to a liquid crystal panel, respectively by said transport device having set spacing in the direction almost perpendicular to a liquid crystal panel.

[Claim 4] The 1st slider which has opening which said movable carriage is a slider to which between said both stages is moved by said 1st driving means, and can receive said panel receptacle and said work table, The 2nd slider of the pair which gets together in this 1st slider, and is arranged movable to phase detached building ******, and carries out said opening in between, and is extended in parallel, It is test equipment according to claim 1, 2, or 3 with which it has an adjustment means to adjust the location of said 2nd slider to said 1st slider, and said holder is arranged at said 2nd slider.

[Claim 5] It is test equipment according to claim 4 combined with another side of said 1st and 2nd sliders with the 2nd shaft received in the slot which each link is formed in the link concerned while being combined with one side of said 1st and 2nd sliders with the 1st shaft, and is extended to the longitudinal direction of the link concerned movable by each 2nd slider being connected with said 1st slider by the link of a pair.

[Claim 6] Said 2nd driving means is test equipment according to claim 2 or 3 which is arranged between the receptacle member which receives said holder possible [displacement] in the direction almost perpendicular to a liquid crystal panel, the drive to which said receptacle member is moved in order to get together and to move said holder to phase detached building ******, and this drive and said holder, and is equipped with the elastic body which energizes said holder in the direction which separates from said drive.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention makes a liquid crystal panel drive, and relates to the equipment which inspects the quality.
[0002]
[Description of the Prior Art] The equipment which inspects a liquid crystal display panel, i.e., a liquid crystal panel, by the help prepares separately the delivery location which delivers the liquid crystal panel to test equipment, and the inspection location which carries out the lighting trial of a liquid crystal panel using a measurement stage, i.e., an inspection stage, from the purpose which prevents breakage of a checking probe, and, generally is conveying a liquid crystal panel from the delivery location to the reverse in an inspection location.
[0003] There are what delivers a liquid crystal panel by the transport device, and is conveyed in a location and an inspection location as this kind of test equipment (JP,5-334227,A), and thing JP,9-138256,A which the function of a conveyance means is added [JP,9-138256,A] to the inspection stage itself which receives a liquid crystal panel at the time of lighting inspection, and you deliver [JP,9-138256,A] the inspection stage itself, and makes it move to a location and an inspection location.
[0004] however, if the former does not have ****** in the location which does not become that a transport device must be delivered and it must be made to move to a location and an inspection location for conveyance of a liquid crystal panel, and the hindrance of it lighting inspection of a transport device at the time of inspection greatly, since it will not become, the transit time of the inspection stage for conveyance and evacuation becomes useless. Moreover, when the arm which receives a liquid crystal panel and is received in a field is used as a conveyance means, since a touch area with an arm becomes large, the former has a possibility of forming an abrasion in a liquid crystal panel at the time of delivery of the liquid crystal panel between an inspection stage and an arm.
[0005] On the other hand, although there are few possibilities of damaging a liquid crystal panel at the time of delivery of a liquid crystal panel in order that the latter may lay a liquid crystal panel in an inspection stage directly, it still has the technical problem that the inspection stage itself must be delivered for conveyance of a liquid crystal panel, and must make it move to a location and an inspection location, therefore the transit time of the inspection stage for liquid crystal panel conveyance itself becomes useless. Moreover, since a conveyance means adsorbs a liquid crystal panel on the inferior surface of tongue, a liquid crystal panel is conveyed in the unstable condition.
[0006]
[Problem(s) to be Solved] The purpose of this invention is to lessen damage on the liquid crystal panel by the conveyance means as much as possible, and lessen time futility by migration of a conveyance means.
[0007]
[A solution means, an operation, and effectiveness] The test equipment of this invention contains the inspection stage arranged in the inspection [which has been arranged in the delivery location of a liquid

crystal panel] location which delivered and is distant from a stage and this delivery stage, and at least two transport devices which convey a liquid crystal panel to both stages. each transport device -- between both stages -- a round trip -- it is the holder of a pair at least and has the holder which set spacing to the movable carriage and has been arranged at it at the condition of having a movable movable carriage, the 1st driving means which carries out both-way migration of this movable carriage, and the hollow in which the edge of a liquid crystal panel is accepted and of having made the hollow countering, and the 2nd driving means to which it gets together in in a field parallel to a liquid crystal panel, and the variation rate of this holder is carried out to phase detached building ******.

[0008] A liquid crystal panel is received in a hollow in the edge which counters by being moved in the direction in which the holder of a transport device gets together, is grasped by the transport device, and is released from a transport device by moving the holder of a transport device to phase detached building ******. Each transport device conveys a liquid crystal panel, where the edge section which a liquid crystal panel counters is accepted in the hollow of a holder. for this reason, stable [without being able to make small the touch area of a holder and a liquid crystal panel, being able to prevent damage on the liquid crystal panel at the time of delivery of the liquid crystal panel between a holder and an inspection stage as a result, and carrying out vacuum adsorption of the liquid crystal panel] -- it can convey by the ** others the bottom.

[0009] the delivery of a liquid crystal panel to test equipment -- a delivery stage -- setting -- a help -- or it is performed by the delivery machine, and inspection of a liquid crystal panel is conducted by the help using a naked eye, or it is mechanically carried out using a television camera, and delivery of a liquid crystal panel to an inspection stage is performed by the transport device.

[0010] it is made to move in the direction where they leave a holder during inspection, and a holder is evacuated slightly -- sufficient -- it is not necessary to evacuate greatly the whole transport device which has conveyed the liquid crystal panel in the inspection location from an inspection location For this reason, there is little time futility by evacuation of a conveyance means remarkably.

[0011] Inspection and delivery of a liquid crystal panel For example, delivery of the liquid crystal panel from one transport device to an inspection stage, While performing inspection of the liquid crystal panel, and delivery of the liquid crystal panel from an inspection stage to one transport device, It delivers from the transport device of another side. Delivery of the inspected liquid crystal panel to a stage, It can carry out by delivering the new liquid crystal panel from a delivery stage to arrangement of removal of the liquid crystal panel from a delivery stage, and the new liquid crystal panel to a delivery stage, and the transport device of another side.

[0012] Conveyance of the liquid crystal panel by both transport devices can be performed by performing conveyance of the liquid crystal panel to the delivery stage by one transport device, and conveyance of the non-inspected liquid crystal panel to the inspection stage by the transport device of another side in parallel. For this reason, there is little time futility by migration of a conveyance means remarkably.

[0013] According to this invention, at least two transport devices which make a conveyance means the holder more than the pair which the hollow in which the edge of a liquid crystal panel is accepted was made to counter are used. Since it gets together in a field parallel to a liquid crystal panel and was made to carry out the variation rate of the holder to phase detached building ****** The touch area of a conveyance means and a liquid crystal panel becomes small, and the time futility by evacuation and migration of a conveyance means decreases, and a liquid crystal panel can be further conveyed in the condition of having been stabilized without carrying out vacuum adsorption.

[0014] A delivery stage is equipped with the panel receptacle which receives a liquid crystal panel, an inspection stage is equipped with the work table which receives a liquid crystal panel, and each of a panel receptacle and a work table is the notch formed at least in each part corresponding to the edge of a pair where a liquid crystal panel counters, and when the variation rate of them is carried out to a Z direction almost perpendicular to a liquid crystal panel, and when it is moved in the direction in which a holder gets together, it can have the notch which accepts this a part of holder. If it does in this way, since a holder is accepted in a notch at the time of the delivery of a liquid crystal panel to each stage, delivery of the liquid crystal panel between each stage and a holder will be carried out to insurance.

[0015] The transport device has set spacing to the Z direction, and a delivery stage and an inspection stage can have the displacement means to which the variation rate of a panel receptacle and the work table is carried out to a Z direction, respectively. If it does in this way, the liquid crystal panel between a holder and each stage can be easily delivered getting together and moving a holder to phase detached building ******, and by carrying out the variation rate of a panel receptacle and the work table to a Z direction.

[0016] The 1st slider which has opening which a movable carriage is a slider to which between both stages is moved by the 1st driving means, and can receive a panel receptacle and a work table, It gets together in this 1st slider and is arranged movable to phase detached building ******, and it can have an adjustment means to adjust the location of the 2nd slider of the pair which carries out said opening in between and is extended in parallel, and the 2nd slider to the 1st slider, and a holder can be arranged to the 2nd slider. If it does in this way, it can use for inspection of the liquid crystal panel with which magnitude differs by changing spacing of the 2nd slider.

[0017] While connecting each 2nd slider with the 1st slider by the link of a pair and combining each link with one side of the 1st and 2nd sliders with the 1st shaft, it is combinable with another side of the 1st and 2nd sliders with the 2nd shaft received in the slot which is formed in the link concerned and extended to the longitudinal direction of the link concerned movable. If it does in this way, it will get together and the migration of the 2nd slider to phase detached building ****** will become parallel.

[0018] The 2nd driving means is arranged between the receptacle member which receives a holder possible [displacement] to a Z direction, the drive to which it receives in order to get together and to move a holder to phase detached building ******, and a member is moved, and this drive and a holder, and can be equipped with the elastic body which energizes a holder in the direction which separates from a drive. If it does in this way, even if a panel receptacle or a work table displaces across the usual location of a holder at the time of delivery of the liquid crystal panel to each stage, a holder will resist the energization force of an elastic body, it will displace, and, thereby, breakage of a liquid crystal panel will be prevented.

[0019] The displacement means of a delivery stage are two cylinder styles which can be expanded and contracted to a Z direction, they can be equipped with two cylinder styles connected with the serial so that the variation rate of one cylinder style may be carried out by telescopic motion of the cylinder style of another side in the direction almost perpendicular to a liquid crystal panel, and they can attach a panel receptacle to one cylinder.

[0020] The panel receptacle of a delivery stage can be equipped with two or more positioning sections which win popularity in order to receive the edge which inclined so that one edge side of the two edges which a liquid crystal panel counters might serve as a lower part and the edge side of another side might serve as the upper part, in which it receives, and which a field, the other-end edge of a liquid crystal panel, and others counter, and project from a field. If it does in this way, rough alignment of a liquid crystal panel can be carried out by making a liquid crystal panel contact the positioning section.

[0021]

[Embodiment of the Invention] Test equipment 10 is used for the lighting inspection with a rectangular liquid crystal display object, i.e., the help of a liquid crystal panel 12, with reference to drawing 1 - drawing 6 . in the example of illustration, the edge section corresponding to the three sides boils a liquid crystal panel 12 among the rectangular sides, respectively, and it has the electrode group which consists of two or more polar zone.

[0022] Hereafter, in order to make an understanding easy, also in any of test equipment 10 and a liquid crystal panel 12, the direction (longitudinal direction) of the long edge of the liquid crystal display panel 12, i.e., a liquid crystal panel, is called direction of X, the direction of the short edge of a liquid crystal panel 12 is called direction (cross direction) of Y, and a direction perpendicular to a liquid crystal panel 12 is called Z direction. Moreover, the axis extended to X, Y, and a Z direction is called X, Y, and Z axis, respectively.

[0023] Test equipment 10 contains a frame 20, i.e., a case. Let the front upper part of a case 20 be the inclined plane section 22. The inclined plane section 22 has the opening 24 used for delivery of a liquid crystal panel 12, and the opening 26 used for inspection of a liquid crystal panel 12. Openings 24 and 26 have the form of the rectangle made round in the corner more greatly than a liquid crystal panel 12, and have set spacing in the direction of X.

[0024] The part corresponding to opening 24 is made into the delivery location which delivers the liquid crystal panel 12 to test equipment 10 in in a case 20, and let the part corresponding to opening 26 be the inspection location which carries out lighting inspection of a liquid crystal panel 12. The switch panel 28 is formed in the inclined plane section 22. A switch panel 28 has two or more switches for carrying out ON/OFF of each device of the test equipment 10 concerned.

[0025] The susceptor 30 which supports various kinds of devices is arranged at the case 20. Susceptor 30 is formed with a base plate 32, the rectangular pedestal 34, and two or more stanchions 36 that connect both. The pedestal 34 is formed of the plate which has a die-length dimension a little shorter than a base plate 32 and a width-of-face dimension, and is extended in the direction of X in the inside of a case 20 in parallel with a base plate 32.

[0026] In the example of illustration, a base plate 32 is a member which forms the inclined plane section 22 of a case 20, therefore openings 24 and 26 are formed in the base plate 32. However, a base plate 32 may be formed by the member other than the member which forms the inclined plane section 22, and a base plate 32 may be attached to the member which forms the inclined plane section 22.

[0027] The probe unit 40 is arranged at the base plate 32. The probe unit 40 is equipped with the probe base 42 which carried out the form of a rectangular plate, and two or more probe blocks 44 of the L character mold attached to the probe base 42 by one or more screw-thread members.

[0028] The probe base 42 has opening 26 and the similar opening 46, and is attached in the outside of a base plate 32 in same axle by two or more screw-thread members. The probe block 44 is arranged at the side section corresponding to the edge section in which it is divided into three block groups in which each includes two or more probe blocks 44, and the electrode group of a liquid crystal panel 12 was formed.

[0029] Each probe block 44 is attached in the outside of the probe base 42 in the other end so that the end section may reach in opening 46 through opening 46. Each probe block 44 is supporting two or more probes 48 in the end section. Each probe 48 is extended in the condition of having an include angle to a liquid crystal panel 12.

[0030] The television camera 50 of the pair for alignment is attached to the probe base 42. The television camera 50 is arranged at the probe base 42 so that the alignment mark currently formed in the liquid crystal panel 12 may be photoed. The output signal of a television camera 50 is used for the precision alignment of the liquid crystal panel 12 to the probe unit 40.

[0031] A pedestal 34 supports the delivery stage 52 for delivery of a liquid crystal panel 12, the inspection stage 54 for lighting inspection, and the 1st and 2nd transport devices 56 that convey a liquid crystal panel 12 in the condition of having inclined. The delivery stage 52 is arranged in the delivery location corresponding to opening 24, and the inspection stage 54 is arranged in the inspection location corresponding to opening 26.

[0032] The delivery stage 52 is equipped with the positioning section 64 of positioning ****** for the plate-like panel receptacle 58 which receives a liquid crystal panel in the condition of having inclined, two cylinder styles 60 and 62 to which the variation rate of the panel receptacle 58 is carried out to a Z direction, and liquid crystal panels 12 to the panel receptacle 58.

[0033] The field of slanting facing up is made into the panel receptacle side in which a panel is laid, and the panel receptacle 58 has one or more notches 66 in each edge side of the direction of Y. In the example of illustration, one long and slender notch 66 extended along with this edge is formed in the end edge side of the direction of Y, and when two notches 66 excise a square corner, it is formed in the other end edge side of the direction of Y. The panel receptacle 58 is attached in the condition that the panel receptacle side inclined at the rod section of the cylinder style 62.

[0034] The cylinder styles 60 and 62 are hydrostatic pressure cylinder styles like a pneumatic cylinder, and they are connected with the serial so that the flexible direction may become the same. One cylinder style 60 is attached in the pedestal 34 by the implement 68 with a group in the cylinder part so that the flexible direction may turn into a Z direction. The cylinder style 62 of another side is connected with the rod section of the cylinder style 60 by the implement 70 with a group in the cylinder part so that the flexible direction may turn into a Z direction.

[0035] The positioning section 64 is formed in the receptacle side of the panel receptacle 58. In the example of illustration, while the two positioning sections 64 are formed in the end edge of the direction of Y, the one positioning section 64 is formed in the other end edge of the direction of Y. Each positioning section 64 has the step which is formed in the shape of a crank in the inside, therefore receives a liquid crystal panel 12 inside.

[0036] The two positioning sections 64 of the end edge of the direction of Y correspond. It is bent in the shape of L character so that the two edge sections with which the notch 66 of an end edge was carried out in between, and spacing is set in the direction of X and which a liquid crystal panel 12 adjoins may contact. The notch 66 of an other end edge does and the positioning section 64 of the other end edge of the direction of Y is formed in the center of an other end edge.

[0037] The inspection stage 54 is equipped with X stage which moves a liquid crystal panel 12 to a longitudinal direction (the direction of X), Y stage which moves a liquid crystal panel 12 in the slanting vertical direction (the direction of Y), the Z stage which makes this panel move a liquid crystal panel 12 in the direction of a right angle (Z direction), theta stage which rotates a liquid crystal panel 12 in include angle around Z axis of a right angle at this panel, and the work table 72 which receives a liquid crystal panel 12.

[0038] Y stage, a Z stage, theta stage, and a work table 72 are similarly moved with migration of the stage which is supported by X stage, Y stage, the Z stage, and theta stage movable, respectively, and corresponds.

[0039] The inspection stage 54 is attached to the pedestal 34 movable on the X stage 30 so that a work table 72 may become a pedestal 34 an opening 24 side and X stage may become it a pedestal 34 side, and so that a liquid crystal panel 12 may be received in the condition of having inclined in the work table 72.

[0040] The work table 72 has the form of the shallow box of the shape of a rectangular parallelepiped which carries out opening to a base-plate 32 side so that a liquid crystal panel 12 may be received and supported. The field of slanting facing up of the four edge sections which form the building envelope of a work table 72 is made into the panel receptacle side where the rectangle which receives a liquid crystal panel 12 in the condition of having inclined inclined.

[0041] A work table 72 has the notch 76 of a pair in each edge section of the direction of Y, and has the edge receptacle 78 of a pair which prevents that a liquid crystal panel 12 slips down from a work table 72 further in one edge section of the direction of Y while it has the slot 74 opened to a panel receptacle side in the three edge sections. In the work table 72, it holds so that the back light unit 80 may illuminate a liquid crystal panel 12 from a tooth back (it is referring to drawing 14 - drawing 17 to drawing 4 and the drawing 6 list).

[0042] The slot 74 is opened for free passage by the source of a vacuum which is not illustrated so that it may act as a vacuum chuck to which it is formed in the part corresponding to the edge section in which the electrode group of a liquid crystal panel 12 was formed, and a work table 72 carries out vacuum adsorption of the rear face of a liquid crystal panel 12. Both the notches 76 that make a pair have set spacing in the direction of Y, and have opened it wide to the side in the front flesh-side side of a work table 72. The notch 76 of a work table 72 is formed in the location corresponding to the notch 66 of the panel receptacle 58.

[0043] The edge receptacle 78 is attached in the edge section by the side of the lower part of a panel receptacle side by two or more screw-thread members, and has set spacing in the direction of X. For this reason, the liquid crystal panel 12 laid in the work table 72 has it prevented that a lower limit edge contacts the edge receptacle 78, and this falls from a work table 72, even if the panel receptacle side of a work table 72 inclines.

[0044] A work table 72 has the stopper 82 of positioning ****** for a liquid crystal panel 12 to a work table 72 again in each of one edge section of the direction of X, and the upper edge section. Spacing is

set in the direction of the edge section which the stopper 82 which makes a pair is ****ed in the edge section to which a panel receptacle side corresponds, and is attached by the member, and corresponds.
[0045] A work table 72 has further the pusher device 84 which presses a liquid crystal panel 12 to a stopper 82 in each of the other-end edge of the direction of X, and the edge section of the direction bottom of Y. In the example of illustration, in the center of the lower edge section, two pusher devices 84 set spacing in the direction of X, and are arranged, and one pusher device 84 is arranged in the center of the other end edge of the direction of X.
[0046] Each pusher device 84 is supported on the inspection stage 54. It has the rolling mechanism 86 which was carried out and which can be reversed, and the rocking object 88 which rotates in include angle and pushes a liquid crystal panel 12 on the surroundings of the axis extended in the direction (Z direction) perpendicular to a liquid crystal panel 12 by this rolling mechanism.
[0047] Each rolling mechanism 86 is supported by the work table 72 so that the output revolving shaft may be extended to a Z direction. As each rolling mechanism 86, the cylinder style of a rotating type, the solenoid device of a rotating type, a motor, etc. can be used.
[0048] Each rocking object 88 can consist of arm 88a attached in the output revolving shaft of a rolling mechanism 86 in the end section, and pin 88b attached in the condition of projecting from the panel receptacle side of a work table 72 slightly to a Z direction in the other end of this arm.
[0049] As for each pusher device 84, a rolling mechanism 86 cancels press of the liquid crystal panel 12 to the stopper 82 which predetermined include-angle inverse rotation of the rocking object 88 is carried out to the stopper 82 which predetermined include-angle rotation of the rocking object 88 is carried out in an one direction, and corresponds a liquid crystal panel 12 when predetermined carries out include-angle rotation to an one direction when predetermined carries out [push and a rolling mechanism 86] an include-angle inversion, and corresponds.
[0050] The pedestal 34 is supporting the support plate 90 of the long and slender pair for both the transport devices 56. Both the support plates 90 are attached to the pedestal 34 so that might carry out both the stages 52 and 54 in between, and spacing may be set in the direction of Y, the cross direction may turn into a Z direction and it may be extended in parallel in the direction of X in an inspection location from a delivery location.
[0051] The rail base 92 of a long and slender pair sets spacing in the upper part of each support plate 90 to a Z direction, and is attached in it to it. All the rail bases 92 are extended in parallel in the direction of X. The rail 94 extended in the direction of X is attached in each rail base 92. It is used in order that the rail 94 of a pair far from a pedestal 34 may receive the 1st transport device 56 far from a pedestal 34, and the rail 94 of the pair near a pedestal 34 is used in order to receive the 2nd transport device 56 near a pedestal 34.
[0052] The KO character-like 1st slider 96 with which each transport device 56 has opening which can receive the panel receptacle 58 and a work table 72 as shown in drawing 8 - drawing 16 , The 2nd slider 98 of the long and slender pair which set spacing in the direction of Y to the 1st slider 96, and was supported to it, It has the 1st drive 100 which carries out both-way migration of the 1st slider 96, two or more holders 102 which set spacing in the direction of X and have been arranged to it at each 2nd slider 98, and two or more 2nd drives 104 to which the variation rate of the holder 102 is carried out in the direction of Y in a field parallel to a liquid crystal panel 12.
[0053] The 1st slider 96 is supported by the rail 94 movable in the direction of X with two or more guides 106, and both-way migration of between both the stages 52 and 54 is carried out with the 1st drive 100. The 2nd slider 98 carried out the delivery stage 52 and the inspection stage 54 in between, and is extended in parallel in the direction of X. Both the sliders 96 and 98 act as a movable carriage with a guide 106. However, the 2nd slider 98 may be omitted and a holder 102 may be arranged to the 1st slider 96.
[0054] Each 1st drive 100 was equipped with the endless belt 112 almost wound around the pulley 110 and both the pulleys 110 of the pair arranged pivotable around Z axis to the both ends of one rail base 92, and drive Hara 114 which rotates one pulley 110, and has connected the endless belt 112 with the 1st slider 96.

[0055] Each drive 100 delivers the 1st slider 96 from an inspection location, and is made to move it to a location by delivering the 1st slider 96, making it move to an inspection location from a location, and reversing a driving source 114, when a driving source 114 rotates normally. A timing belt can be used as an endless belt 112, and a timing pulley is used as a pulley 110 in this case.

[0056] Each holder 102 is supported by the condition that the inside turned the hollow with the 2nd drive 104 which has the hollow in which the edge of a liquid crystal panel is accepted, and corresponds at the 2nd slider 98, as shown in drawing 6 . Each holder 102 is maintained in the location corresponding to the notches 66 and 76 of the panel receptacle 58 and a work table 72. The holder 102 arranged at one 2nd slider 98 and the holder 102 arranged at the 2nd slider 98 of another side are making the hollow counter.

[0057] In the example of illustration, each 2nd drive 104 is equipped with a hydrostatic pressure cylinder style like a pneumatic cylinder as a driving source, and is attached in the 2nd slider 98 in the cylinder part, and has attached the holder 102 in rod section 104b with the implement with a group further.

[0058] As shown in drawing 6 , the implement with a group is arranged between the block 116 with a group attached in rod section 104b of the 2nd drive 104, the shaft 118 which is extended from block 116 to a Z direction, and receives a holder 102 possible [displacement] to a Z direction, and block 116 and a holder 102, and is equipped with the elastic body 120 which energizes a holder 102 in the direction which separates from rod section 104b.

[0059] A shaft 118 has the flange which prevents omission of a holder 102 at the near edge of block 116 and the contrary. Although an elastic body 120 is a compression coil spring arranged at the shaft 118 in the example of illustration, they may be other elastic bodies like rubber. Each holder 102 has formed the shock absorbing material 122 for preventing damaging a liquid crystal panel 12 in the KO character-like medial surface.

[0060] Next, the drawing 8 - drawing 15 reference is carried out, and actuation of the delivery stage 52 and a transport device 56 is explained.

[0061] Each transport device 56 is retreating the location which is moved to the delivery location and does not bar as opposed to the panel receptacle 58 for a holder 102 delivery of a liquid crystal panel 12 so that it may be shown at the time of standby, for example, drawing 8 . The delivery stage 52 expands both the cylinder style 60, and is making the location (height location) in the Z direction of the holder 102 of the 1st transport device (high side) 56 far from a pedestal 34, and the location in agreement carry out the variation rate of the panel receptacle 58.

[0062] In the condition of the above [the delivery stage 52 and a transport device 56], the liquid crystal panel 12 which should be inspected is delivered by the help, and is arranged at the panel receptacle 58 of a stage 52. at this time, fitting of the liquid crystal panel 12 is carried out to the space formed of the positioning section 64 -- the panel receptacle 58 -- receiving -- positioning ****.

[0063] Subsequently, the 1st transport device 56 operates and a holder 102 is moved by the 2nd drive 104 towards the inside in the direction in which it gets together. Thereby, a liquid crystal panel 12 is received in the hollow of the holder 102 of the 1st transport device 56 in the edge section of the direction of Y, as shown in drawing 9 . Since each holder 102 is accepted in the notch 66 of the panel receptacle 58 in that part at this time, the edge section of a liquid crystal panel 12 is accepted safely and certainly.

[0064] Subsequently, as shown in drawing 10 , the cylinder style 62 is contracted and the panel receptacle 58 descends to the location of the holder 102 of the 2nd transport device 56 near a pedestal 34 (low side) along with Z axis. Thereby, a liquid crystal panel 12 is passed to the 1st transport device 56, and is maintained by the condition of having inclined in the transport device 56.

[0065] Subsequently, it is moved towards an inspection location by the drive 100 with which the 1st transport device 56 corresponds. Thereby, as shown in drawing 11 , the 2nd transport device 56 delivers and it remains in a location. Moreover, a liquid crystal panel 12 is conveyed in the condition of having made the edge of the bottom contacting the inner side of the hollow of the lower holder 102. Thereby, a liquid crystal panel 12 is maintained by the condition of having carried out rough alignment.

[0066] By the work table 72 of the inspection stage 54 going up along with Z axis, and retreating in the location where the holder 102 of the 1st transport device 56 subsequently does not bar lighting inspection of a liquid crystal panel, the non-inspected liquid crystal panel conveyed by the 1st transport device 56 in the inspection location is passed to the inspection stage 54 from the 1st transport device 56, and lighting inspection is carried out so that it may explain later. The liquid crystal panel which inspection ended can be received in the holder 12 of the 1st transport device 56.

[0067] While the non-inspected liquid crystal panel was conveyed by the 1st transport device 56 in the inspection location and the liquid crystal panel is undergoing lighting inspection, it delivers, as the new non-inspected liquid crystal panel 12 shows drawing 11 , it is arranged at the panel receptacle 58 of a stage 52, as the holder 102 of the 2nd transport device 56 shows drawing 12 , it moves forward, and as the cylinder style 60 shows after that drawing 13 , it contracts. As the new liquid crystal panel 12 shows by this drawing 13 , it can receive in the 2nd transport device 56.

[0068] Subsequently, while a liquid crystal panel [finishing / inspection] delivers by the 1st transport device 56 and is returned to a location, a new liquid crystal panel is conveyed by the 2nd transport device 56 in an inspection location.

[0069] If a liquid crystal panel [finishing / inspection] delivers and it is conveyed in a location, the panel receptacle 58 will go up [first] along with Z axis in the height location of the holder 102 of the 1st transport device 56 by both the cylinder styles 60 and 62, and, subsequently the holder 102 of the 1st transport device 56 will retreat in the location which does not bar the delivery of a liquid crystal panel to the panel receptacle 58. Thereby, a liquid crystal panel [finishing / inspection] is passed to the panel receptacle 58.

[0070] Subsequently, a liquid crystal panel [finishing / the inspection on the panel receptacle 58] is removed from the panel receptacle 58, and a new non-inspected liquid crystal panel is arranged at the panel receptacle 58. Delivery of the liquid crystal panel at this time is also performed by the help.

[0071] The liquid crystal panel conveyed by the 2nd transport device 56 in the inspection location is passed to the inspection stage 54 like the above, undergoes lighting inspection, and is returned to the 2nd transport device 56 after that.

[0072] After that, conveyance of the liquid crystal panel [finishing / inspection] by one transport device and conveyance of the liquid crystal panel which is not inspected according to the transport device of another side synchronize, and are repeated, and lighting inspection of a liquid crystal panel is conducted between them.

[0073] As mentioned above, the time futility by migration of a transport device decreases remarkably by performing conveyance of the liquid crystal panel to the delivery stage by one transport device, and conveyance of the non-inspected liquid crystal panel to the inspection stage by the transport device of another side in parallel. In addition, removal of a liquid crystal panel [finishing / the inspection from the arrangement of a non-inspected liquid crystal panel and the panel receptacle 58 to the panel receptacle 58] may be performed mechanically.

[0074] Next, with reference to drawing 14 - drawing 17 , delivery of the liquid crystal panel between the inspection stage 54 and a transport device 56 is explained.

[0075] In the condition that the transport device 56 was moved to the inspection location, the non-inspected liquid crystal panel 12 is maintained more nearly up than the height location of the work table 72 in a Z direction by the transport device 56, as shown in drawing 14 .

[0076] In the above-mentioned condition, a work table 72 goes up along with Z axis by the Z stage of the inspection stage 54, and vacuum adsorption of the liquid crystal panel 12 is carried out until the panel receptacle side of a work table 72 becomes the height location of the holder 102 in a Z direction first, as shown in drawing 15 .

[0077] Subsequently, the holder 102 of a transport device 56 retreats in the location which does not bar lighting inspection, as shown in drawing 16 . Thereby, a liquid crystal panel 12 is completely passed to a work table 72.

[0078] Subsequently, the alignment mark formed in the liquid crystal panel 12 is photoed with the television camera 50 for alignment, and the variation rate of the work table 72 is carried out by each stage of the inspection stage 54 so that an alignment mark may serve as a predetermined coordinate location based on the output signal. Thereby, precision alignment of the liquid crystal panel 12 to the probe unit 40 is performed.

[0079] Subsequently, as shown in drawing 17 , a work table 72 goes up along with the Z-axis further by the Z stage of the inspection stage 54, and, thereby, the polar zone of a liquid crystal panel 12 is pressed by the probe 48 of the probe unit 40.

[0080] Subsequently, where the back light unit 80 is turned on, it energizes to a liquid crystal panel. Thereby, since a liquid crystal panel 12 is turned on by the predetermined pattern, the quality of a liquid crystal panel 12 is judged by checking the right or wrong of a lighting condition. The right or wrong of a lighting condition are checked by viewing of an operator.

[0081] After lighting inspection is completed, a work table 72 is lowered along with Z axis until the panel receptacle side of a work table 72 becomes the height location of the holder 102 in a Z direction, a holder 102 moves forward, a liquid crystal panel is wide opened from vacuum adsorption of a work table, and a work table descends along with Z axis further after that. Thereby, a liquid crystal panel 12 can be received in a holder 102.

[0082] As mentioned above, since a part of each holder 102 is accepted in the notch 76 formed in the work table 72 when a work table 72 and a holder 102 are moved relatively, the relative movement of a work table 72 and a holder 102 is not barred, but delivery of the liquid crystal panel between both is ensured.

[0083] Next, with reference to drawing 7 and drawing 18 , the detail of delivery of the alignment of the liquid crystal panel 12 on the work table 72 by the pusher device 84 and the liquid crystal panel 12 from a holder 102 to a work table 72 is explained.

[0084] First, it goes up until a work table 72 contacts a liquid crystal panel 12 in the condition that the liquid crystal panel 12 is maintained by the holder 102 more nearly up than the height location of the work table 72 in a Z direction, as shown in drawing 18 (A).

[0085] Subsequently, as shown in drawing 18 (A), each pusher device 84 operates, and the variation rate of the liquid crystal panel 12 is turned and carried out to a stopper 82. That is, a liquid crystal panel 12 is moved to the location shown in this drawing according to a two-dot chain line from the location shown in drawing 7 as a continuous line, and the two edges which the liquid crystal panel 12 adjoins are contacted by the stopper 82.

[0086] Even if the location of a liquid crystal panel displaces some the above-mentioned result at the time of conveyance of the liquid crystal panel by the transport device 56, and delivery of the liquid crystal panel from a holder 102 to a work table 72 at the time of delivery of the liquid crystal panel from the panel receptacle 58 of the delivery stage 54 to a holder 102, a liquid crystal panel 12 is carried out in alignment so that the alignment mark may enter in the visual field of the television camera 50 for alignment.

[0087] Subsequently, a work table 72 goes up along with Z axis further, as shown in drawing 18 (C). Thereby, a liquid crystal panel 12 can be received in a work table 72.

[0088] Subsequently, a work table 72 goes up in the location which the force of an elastic body 120 is resisted [location] and raises a holder 102 as shown in drawing 18 (D), and vacuum adsorption of the liquid crystal panel 12 is carried out in the condition at a work table 72. Thereby, a liquid crystal panel 12 is in the condition pressed by the work table 72, and since vacuum adsorption is carried out at a work table 72, it is held certainly at a work table 72.

[0089] Subsequently, as shown in drawing 18 (E), a work table 72 is slightly lowered along with Z axis, and it retreats to the location where a holder 102 does not become the hindrance of lighting inspection so that it may be shown subsequently to drawing 18 (F).

[0090] When passing a liquid crystal panel [finishing / inspection] to a holder 102 from a work table 72, actuation contrary to the above is performed in order of drawing 18 (F), (C), (B), and (A). In this case, when the pusher device 84 returns to the original condition, it originates in the top face of a work table 72 inclining, a liquid crystal panel displaces to a work table 72 and a holder 102, and a liquid crystal panel contacts the inner side of the hollow of the lower holder 102 in the edge of that bottom.

[0091] A holder 102 moves forward or retreats, where a liquid crystal panel 12 is contacted. However, the shock absorbing material 122 arranged in the hollow of each holder 102 prevents that an abrasion is formed in a liquid crystal panel 12 at this time.

[0092] In addition, get together and the 1st slider 96 is made to support both the 2nd slider 98 movable to phase detached building ****** (the direction of Y). By attaching a holder 102 in the 2nd slider 98, getting together with a drive, synchronizing to phase detached building ****** and moving both the 2nd slider 98 to it You may make it adjust according to the magnitude of the liquid crystal panel which may be made to carry out grasping and its discharge of the liquid crystal panel by the holder, and should inspect the maximum spacing of both the 2nd holder 98.

[0093] The pusher device 84 is continuing actuation until lighting inspection of a liquid crystal panel ends early, therefore the liquid crystal panel 12 is pressed by the stopper 82. For this reason, even if the rate of the area of the adsorption side by the slot 74 to the magnitude of a liquid crystal panel is small, a liquid crystal panel is maintained by stability, and even if it is a big liquid crystal panel, it can inspect correctly. Moreover, when a liquid crystal panel is pressed to a probe unit, the variation rate of the liquid crystal panel resulting from the thrust which acts on a liquid crystal panel, a unbalanced force, etc. is prevented.

[0094] In the transport device 130 shown in drawing 19 - drawing 21 , the 2nd slider 98 gets together in the 1st slider 96, and is arranged movable to phase detached building ******. The rail 132 extended in the direction of Y is formed in the top face of the 1st slider 96, and two or more guides 134 which were able to receive in the rail 132 possible [sliding] to the longitudinal direction are formed in the 2nd slider 98.

[0095] The 2nd slider 98 is supported by the 1st slider 96 in the shape of a cantilever with a rail 132 and a guide 134. For this reason, each 2nd slider 98 is further connected with the 1st slider 96 by the link 136 in two each which set spacing in the direction of X.

[0096] Each link 136 has the slot 138 extended to the longitudinal direction of the link concerned. Each link 136 is combined with the 1st slider 96 with the 2nd shaft 142 received in the slot 138 movable to the longitudinal direction while being combined with the 2nd slider 98 with the 1st shaft 140.

[0097] When both the 2nd slider 98 is detached most, as shown in drawing 19 , each link 136 is extended in the direction of X, and the 2nd shaft 142 is approaching the 1st shaft 140 most.

[0098] However, when the 2nd slider 98 is made to approach gradually, a link 136 comes to have an include angle to the direction of X, as by making it change gradually shows the location to a slot 138 to drawing 21 so that the 2nd shaft 142 may separate from the 1st shaft 140 gradually.

[0099] For this reason, a transport device 130 can adjust spacing of the 2nd slider 98 according to the magnitude of the liquid crystal panel 12 which should be inspected. The location of the 2nd slider 98 to the 1st slider 96 is maintainable possible [discharge] with two or more screw-thread members 144. Each **** member 144 is screwed with the 2nd slider 98, and is making the tip contact a rail 132.

[0100] Instead of making it combine with the 2nd slider 98 with the 1st shaft 140, and combining each link 136 with the 1st slider 96 with the 2nd shaft 142, it is made to combine with the 1st slider 96 with the 1st shaft 140, and association, now ** are good for the 2nd slider 98 by the 2nd shaft 142.

[0101] This invention is not limited to the above-mentioned example. For example, this invention is applicable also to the automatic test equipment which inspects a liquid crystal panel by computer based on the output signal using a proper image pick-up means not only like the visual inspection equipment inspected by viewing of an operator but a television camera. Moreover, the plunger device which used the solenoid may be used instead of the cylinder style as a drive.

[0102] This invention can be applied not only to the equipment which inspects a liquid crystal panel in the condition of having inclined again but to the equipment which inspects a liquid crystal panel in the horizontal or vertical condition, can be applied not only to a square liquid crystal panel but to the liquid crystal panel of other polygons, such as a hexagon and an octagon, and can be applied also to the equipment which inspects a liquid crystal panel further using the electrode prepared in the one polygonal side.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention makes a liquid crystal panel drive, and relates to the equipment which inspects the quality.

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PRIOR ART

[Description of the Prior Art] The equipment which inspects a liquid crystal display panel, i.e., a liquid crystal panel, by the help prepares separately the delivery location which delivers the liquid crystal panel to test equipment, and the inspection location which carries out the lighting trial of a liquid crystal panel using a measurement stage, i.e., an inspection stage, from the purpose which prevents breakage of a checking probe, and, generally is conveying a liquid crystal panel from the delivery location to the reverse in an inspection location.
[0003] There are what delivers a liquid crystal panel by the transport device, and is conveyed in a location and an inspection location as this kind of test equipment (JP,5-334227,A), and thing JP,9-138256,A which the function of a conveyance means is added [JP,9-138256,A] to the inspection stage itself which receives a liquid crystal panel at the time of lighting inspection, and you deliver [JP,9-138256,A] the inspection stage itself, and makes it move to a location and an inspection location.
[0004] however, if the former does not have ****** in the location which does not become that a transport device must be delivered and it must be made to move to a location and an inspection location for conveyance of a liquid crystal panel, and the hindrance of it lighting inspection of a transport device at the time of inspection greatly, since it will not become, the transit time of the inspection stage for conveyance and evacuation becomes useless. Moreover, when the arm which receives a liquid crystal panel and is received in a field is used as a conveyance means, since a touch area with an arm becomes large, the former has a possibility of forming an abrasion in a liquid crystal panel at the time of delivery of the liquid crystal panel between an inspection stage and an arm.
[0005] On the other hand, although there are few possibilities of damaging a liquid crystal panel at the time of delivery of a liquid crystal panel in order that the latter may lay a liquid crystal panel in an inspection stage directly, it still has the technical problem that the inspection stage itself must be delivered for conveyance of a liquid crystal panel, and must make it move to a location and an inspection location, therefore the transit time of the inspection stage for liquid crystal panel conveyance itself becomes useless. Moreover, since a conveyance means adsorbs a liquid crystal panel on the inferior surface of tongue, a liquid crystal panel is conveyed in the unstable condition.

[Translation done.]

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EFFECT OF THE INVENTION

[A solution means, an operation, and effectiveness] The test equipment of this invention contains the inspection stage arranged in the inspection [which has been arranged in the delivery location of a liquid crystal panel] location which delivered and is distant from a stage and this delivery stage, and at least two transport devices which convey a liquid crystal panel to both stages. each transport device -- between both stages -- a round trip -- it is the holder of a pair at least and has the holder which set spacing to the movable carriage and has been arranged at it at the condition of having a movable movable carriage, the 1st driving means which carries out both-way migration of this movable carriage, and the hollow in which the edge of a liquid crystal panel is accepted and of having made the hollow countering, and the 2nd driving means to which it gets together in in a field parallel to a liquid crystal panel, and the variation rate of this holder is carried out to phase detached building ******.
[0008] A liquid crystal panel is received in a hollow in the edge which counters by being moved in the direction in which the holder of a transport device gets together, is grasped by the transport device, and is released from a transport device by moving the holder of a transport device to phase detached building ******. Each transport device conveys a liquid crystal panel, where the edge section which a liquid crystal panel counters is accepted in the hollow of a holder. for this reason, stable [without being able to make small the touch area of a holder and a liquid crystal panel, being able to prevent damage on the liquid crystal panel at the time of delivery of the liquid crystal panel between a holder and an inspection stage as a result, and carrying out vacuum adsorption of the liquid crystal panel] -- it can convey by the ** others the bottom.
[0009] the delivery of a liquid crystal panel to test equipment -- a delivery stage -- setting -- a help -- or it is performed by the delivery machine, and inspection of a liquid crystal panel is conducted by the help using a naked eye, or it is mechanically carried out using a television camera, and delivery of a liquid crystal panel to an inspection stage is performed by the transport device.
[0010] it is made to move in the direction where they leave a holder during inspection, and a holder is evacuated slightly -- sufficient -- it is not necessary to evacuate greatly the whole transport device which has conveyed the liquid crystal panel in the inspection location from an inspection location For this reason, there is little time futility by evacuation of a conveyance means remarkably.
[0011] Inspection and delivery of a liquid crystal panel For example, delivery of the liquid crystal panel from one transport device to an inspection stage, While performing inspection of the liquid crystal panel, and delivery of the liquid crystal panel from an inspection stage to one transport device, It delivers from the transport device of another side. Delivery of the inspected liquid crystal panel to a stage, It can carry out by delivering the new liquid crystal panel from a delivery stage to arrangement of removal of the liquid crystal panel from a delivery stage, and the new liquid crystal panel to a delivery stage, and the transport device of another side.
[0012] Conveyance of the liquid crystal panel by both transport devices can be performed by performing conveyance of the liquid crystal panel to the delivery stage by one transport device, and conveyance of the non-inspected liquid crystal panel to the inspection stage by the transport device of another side in parallel. For this reason, there is little time futility by migration of a conveyance means remarkably.

[0013] According to this invention, at least two transport devices which make a conveyance means the holder more than the pair which the hollow in which the edge of a liquid crystal panel is accepted was made to counter are used. Since it gets together in a field parallel to a liquid crystal panel and was made to carry out the variation rate of the holder to phase detached building ****** The touch area of a conveyance means and a liquid crystal panel becomes small, and the time futility by evacuation and migration of a conveyance means decreases, and a liquid crystal panel can be further conveyed in the condition of having been stabilized without carrying out vacuum adsorption.

[0014] A delivery stage is equipped with the panel receptacle which receives a liquid crystal panel, an inspection stage is equipped with the work table which receives a liquid crystal panel, and each of a panel receptacle and a work table is the notch formed at least in each part corresponding to the edge of a pair where a liquid crystal panel counters, and when the variation rate of them is carried out to a Z direction almost perpendicular to a liquid crystal panel, and when it is moved in the direction in which a holder gets together, it can have the notch which accepts this a part of holder. If it does in this way, since a holder is accepted in a notch at the time of the delivery of a liquid crystal panel to each stage, delivery of the liquid crystal panel between each stage and a holder will be carried out to insurance.

[0015] The transport device has set spacing to the Z direction, and a delivery stage and an inspection stage can have the displacement means to which the variation rate of a panel receptacle and the work table is carried out to a Z direction, respectively. If it does in this way, the liquid crystal panel between a holder and each stage can be easily delivered getting together and moving a holder to phase detached building ******, and by carrying out the variation rate of a panel receptacle and the work table to a Z direction.

[0016] The 1st slider which has opening which a movable carriage is a slider to which between both stages is moved by the 1st driving means, and can receive a panel receptacle and a work table, It gets together in this 1st slider and is arranged movable to phase detached building ******, and it can have an adjustment means to adjust the location of the 2nd slider of the pair which carries out said opening in between and is extended in parallel, and the 2nd slider to the 1st slider, and a holder can be arranged to the 2nd slider. If it does in this way, it can use for inspection of the liquid crystal panel with which magnitude differs by changing spacing of the 2nd slider.

[0017] While connecting each 2nd slider with the 1st slider by the link of a pair and combining each link with one side of the 1st and 2nd sliders with the 1st shaft, it is combinable with another side of the 1st and 2nd sliders with the 2nd shaft received in the slot which is formed in the link concerned and extended to the longitudinal direction of the link concerned movable. If it does in this way, it will get together and the migration of the 2nd slider to phase detached building ****** will become parallel.

[0018] The 2nd driving means is arranged between the receptacle member which receives a holder possible [displacement] to a Z direction, the drive to which it receives in order to get together and to move a holder to phase detached building ******, and a member is moved, and this drive and a holder, and can be equipped with the elastic body which energizes a holder in the direction which separates from a drive. If it does in this way, even if a panel receptacle or a work table displaces across the usual location of a holder at the time of delivery of the liquid crystal panel to each stage, a holder will resist the energization force of an elastic body, it will displace, and, thereby, breakage of a liquid crystal panel will be prevented.

[0019] The displacement means of a delivery stage are two cylinder styles which can be expanded and contracted to a Z direction, they can be equipped with two cylinder styles connected with the serial so that the variation rate of one cylinder style may be carried out by telescopic motion of the cylinder style of another side in the direction almost perpendicular to a liquid crystal panel, and they can attach a panel receptacle to one cylinder.

[0020] The panel receptacle of a delivery stage can be equipped with two or more positioning sections which win popularity in order to receive the edge which inclined so that one edge side of the two edges which a liquid crystal panel counters might serve as a lower part and the edge side of another side might serve as the upper part, in which it receives, and which a field, the other-end edge of a liquid crystal panel, and others counter, and project from a field. If it does in this way, rough alignment of a liquid

crystal panel can be carried out by making a liquid crystal panel contact the positioning section.
[0021]
[Embodiment of the Invention] Test equipment 10 is used for the lighting inspection with a rectangular liquid crystal display object, i.e., the help of a liquid crystal panel 12, with reference to drawing 1 - drawing 6 . in the example of illustration, the edge section corresponding to the three sides boils a liquid crystal panel 12 among the rectangular sides, respectively, and it has the electrode group which consists of two or more polar zone.
[0022] Hereafter, in order to make an understanding easy, also in any of test equipment 10 and a liquid crystal panel 12, the direction (longitudinal direction) of the long edge of the liquid crystal display panel 12, i.e., a liquid crystal panel, is called direction of X, the direction of the short edge of a liquid crystal panel 12 is called direction (cross direction) of Y, and a direction perpendicular to a liquid crystal panel 12 is called Z direction. Moreover, the axis extended to X, Y, and a Z direction is called X, Y, and Z axis, respectively.
[0023] Test equipment 10 contains a frame 20, i.e., a case. Let the front upper part of a case 20 be the inclined plane section 22. The inclined plane section 22 has the opening 24 used for delivery of a liquid crystal panel 12, and the opening 26 used for inspection of a liquid crystal panel 12. Openings 24 and 26 have the form of the rectangle made round in the corner more greatly than a liquid crystal panel 12, and have set spacing in the direction of X.
[0024] The part corresponding to opening 24 is made into the delivery location which delivers the liquid crystal panel 12 to test equipment 10 in in a case 20, and let the part corresponding to opening 26 be the inspection location which carries out lighting inspection of a liquid crystal panel 12. The switch panel 28 is formed in the inclined plane section 22. A switch panel 28 has two or more switches for carrying out ON/OFF of each device of the test equipment 10 concerned.
[0025] The susceptor 30 which supports various kinds of devices is arranged at the case 20. Susceptor 30 is formed with a base plate 32, the rectangular pedestal 34, and two or more stanchions 36 that connect both. The pedestal 34 is formed of the plate which has a die-length dimension a little shorter than a base plate 32 and a width-of-face dimension, and is extended in the direction of X in the inside of a case 20 in parallel with a base plate 32.
[0026] In the example of illustration, a base plate 32 is a member which forms the inclined plane section 22 of a case 20, therefore openings 24 and 26 are formed in the base plate 32. However, a base plate 32 may be formed by the member other than the member which forms the inclined plane section 22, and a base plate 32 may be attached to the member which forms the inclined plane section 22.
[0027] The probe unit 40 is arranged at the base plate 32. The probe unit 40 is equipped with the probe base 42 which carried out the form of a rectangular plate, and two or more probe blocks 44 of the L character mold attached to the probe base 42 by one or more screw-thread members.
[0028] The probe base 42 has opening 26 and the similar opening 46, and is attached in the outside of a base plate 32 in same axle by two or more screw-thread members. The probe block 44 is arranged at the side section corresponding to the edge section in which it is divided into three block groups in which each includes two or more probe blocks 44, and the electrode group of a liquid crystal panel 12 was formed.
[0029] Each probe block 44 is attached in the outside of the probe base 42 in the other end so that the end section may reach in opening 46 through opening 46. Each probe block 44 is supporting two or more probes 48 in the end section. Each probe 48 is extended in the condition of having an include angle to a liquid crystal panel 12.
[0030] The television camera 50 of the pair for alignment is attached to the probe base 42. The television camera 50 is arranged at the probe base 42 so that the alignment mark currently formed in the liquid crystal panel 12 may be photoed. The output signal of a television camera 50 is used for the precision alignment of the liquid crystal panel 12 to the probe unit 40.
[0031] A pedestal 34 supports the delivery stage 52 for delivery of a liquid crystal panel 12, the inspection stage 54 for lighting inspection, and the 1st and 2nd transport devices 56 that convey a liquid crystal panel 12 in the condition of having inclined. The delivery stage 52 is arranged in the delivery

location corresponding to opening 24, and the inspection stage 54 is arranged in the inspection location corresponding to opening 26.

[0032] The delivery stage 52 is equipped with the positioning section 64 of positioning ****** for the plate-like panel receptacle 58 which receives a liquid crystal panel in the condition of having inclined, two cylinder styles 60 and 62 to which the variation rate of the panel receptacle 58 is carried out to a Z direction, and liquid crystal panels 12 to the panel receptacle 58.

[0033] The field of slanting facing up is made into the panel receptacle side in which a panel is laid, and the panel receptacle 58 has one or more notches 66 in each edge side of the direction of Y. In the example of illustration, one long and slender notch 66 extended along with this edge is formed in the end edge side of the direction of Y, and when two notches 66 excise a square corner, it is formed in the other end edge side of the direction of Y. The panel receptacle 58 is attached in the condition that the panel receptacle side inclined at the rod section of the cylinder style 62.

[0034] The cylinder styles 60 and 62 are hydrostatic pressure cylinder styles like a pneumatic cylinder, and they are connected with the serial so that the flexible direction may become the same. One cylinder style 60 is attached in the pedestal 34 by the implement 68 with a group in the cylinder part so that the flexible direction may turn into a Z direction. The cylinder style 62 of another side is connected with the rod section of the cylinder style 60 by the implement 70 with a group in the cylinder part so that the flexible direction may turn into a Z direction.

[0035] The positioning section 64 is formed in the receptacle side of the panel receptacle 58. In the example of illustration, while the two positioning sections 64 are formed in the end edge of the direction of Y, the one positioning section 64 is formed in the other end edge of the direction of Y. Each positioning section 64 has the step which is formed in the shape of a crank in the inside, therefore receives a liquid crystal panel 12 inside.

[0036] The two positioning sections 64 of the end edge of the direction of Y correspond. It is bent in the shape of L character so that the two edge sections with which the notch 66 of an end edge was carried out in between, and spacing is set in the direction of X and which a liquid crystal panel 12 adjoins may contact. The notch 66 of an other end edge does and the positioning section 64 of the other end edge of the direction of Y is formed in the center of an other end edge.

[0037] The inspection stage 54 is equipped with X stage which moves a liquid crystal panel 12 to a longitudinal direction (the direction of X), Y stage which moves a liquid crystal panel 12 in the slanting vertical direction (the direction of Y), the Z stage which makes this panel move a liquid crystal panel 12 in the direction of a right angle (Z direction), theta stage which rotates a liquid crystal panel 12 in include angle around Z axis of a right angle at this panel, and the work table 72 which receives a liquid crystal panel 12.

[0038] Y stage, a Z stage, theta stage, and a work table 72 are similarly moved with migration of the stage which is supported by X stage, Y stage, the Z stage, and theta stage movable, respectively, and corresponds.

[0039] The inspection stage 54 is attached to the pedestal 34 movable on the X stage 30 so that a work table 72 may become a pedestal 34 an opening 24 side and X stage may become it a pedestal 34 side, and so that a liquid crystal panel 12 may be received in the condition of having inclined in the work table 72.

[0040] The work table 72 has the form of the shallow box of the shape of a rectangular parallelepiped which carries out opening to a base-plate 32 side so that a liquid crystal panel 12 may be received and supported. The field of slanting facing up of the four edge sections which form the building envelope of a work table 72 is made into the panel receptacle side where the rectangle which receives a liquid crystal panel 12 in the condition of having inclined inclined.

[0041] A work table 72 has the notch 76 of a pair in each edge section of the direction of Y, and has the edge receptacle 78 of a pair which prevents that a liquid crystal panel 12 slips down from a work table 72 further in one edge section of the direction of Y while it has the slot 74 opened to a panel receptacle side in the three edge sections. In the work table 72, it holds so that the back light unit 80 may illuminate a liquid crystal panel 12 from a tooth back (it is referring to drawing 14 - drawing 17 to drawing 4 and

the drawing 6 list).
[0042] The slot 74 is opened for free passage by the source of a vacuum which is not illustrated so that it may act as a vacuum chuck to which it is formed in the part corresponding to the edge section in which the electrode group of a liquid crystal panel 12 was formed, and a work table 72 carries out vacuum adsorption of the rear face of a liquid crystal panel 12. Both the notches 76 that make a pair have set spacing in the direction of Y, and have opened it wide to the side in the front flesh-side side of a work table 72. The notch 76 of a work table 72 is formed in the location corresponding to the notch 66 of the panel receptacle 58.
[0043] The edge receptacle 78 is attached in the edge section by the side of the lower part of a panel receptacle side by two or more screw-thread members, and has set spacing in the direction of X. For this reason, the liquid crystal panel 12 laid in the work table 72 has it prevented that a lower limit edge contacts the edge receptacle 78, and this falls from a work table 72, even if the panel receptacle side of a work table 72 inclines.
[0044] A work table 72 has the stopper 82 of positioning ****** for a liquid crystal panel 12 to a work table 72 again in each of one edge section of the direction of X, and the upper edge section. Spacing is set in the direction of the edge section which the stopper 82 which makes a pair is ****ed in the edge section to which a panel receptacle side corresponds, and is attached by the member, and corresponds.
[0045] A work table 72 has further the pusher device 84 which presses a liquid crystal panel 12 to a stopper 82 in each of the other-end edge of the direction of X, and the edge section of the direction bottom of Y. In the example of illustration, in the center of the lower edge section, two pusher devices 84 set spacing in the direction of X, and are arranged, and one pusher device 84 is arranged in the center of the other end edge of the direction of X.
[0046] Each pusher device 84 is supported on the inspection stage 54. It has the rolling mechanism 86 which was carried out and which can be reversed, and the rocking object 88 which rotates in include angle and pushes a liquid crystal panel 12 on the surroundings of the axis extended in the direction (Z direction) perpendicular to a liquid crystal panel 12 by this rolling mechanism.
[0047] Each rolling mechanism 86 is supported by the work table 72 so that the output revolving shaft may be extended to a Z direction. As each rolling mechanism 86, the cylinder style of a rotating type, the solenoid device of a rotating type, a motor, etc. can be used.
[0048] Each rocking object 88 can consist of arm 88a attached in the output revolving shaft of a rolling mechanism 86 in the end section, and pin 88b attached in the condition of projecting from the panel receptacle side of a work table 72 slightly to a Z direction in the other end of this arm.
[0049] As for each pusher device 84, a rolling mechanism 86 cancels press of the liquid crystal panel 12 to the stopper 82 which predetermined include-angle inverse rotation of the rocking object 88 is carried out to the stopper 82 which predetermined include-angle rotation of the rocking object 88 is carried out in an one direction, and corresponds a liquid crystal panel 12 when predetermined carries out include-angle rotation to an one direction when predetermined carries out [push and a rolling mechanism 86] an include-angle inversion, and corresponds.
[0050] The pedestal 34 is supporting the support plate 90 of the long and slender pair for both the transport devices 56. Both the support plates 90 are attached to the pedestal 34 so that might carry out both the stages 52 and 54 in between, and spacing may be set in the direction of Y, the cross direction may turn into a Z direction and it may be extended in parallel in the direction of X in an inspection location from a delivery location.
[0051] The rail base 92 of a long and slender pair sets spacing in the upper part of each support plate 90 to a Z direction, and is attached in it to it. All the rail bases 92 are extended in parallel in the direction of X. The rail 94 extended in the direction of X is attached in each rail base 92. It is used in order that the rail 94 of a pair far from a pedestal 34 may receive the 1st transport device 56 far from a pedestal 34, and the rail 94 of the pair near a pedestal 34 is used in order to receive the 2nd transport device 56 near a pedestal 34.
[0052] The KO character-like 1st slider 96 with which each transport device 56 has opening which can receive the panel receptacle 58 and a work table 72 as shown in drawing 8 - drawing 16 , The 2nd slider

98 of the long and slender pair which set spacing in the direction of Y to the 1st slider 96, and was supported to it, It has the 1st drive 100 which carries out both-way migration of the 1st slider 96, two or more holders 102 which set spacing in the direction of X and have been arranged to it at each 2nd slider 98, and two or more 2nd drives 104 to which the variation rate of the holder 102 is carried out in the direction of Y in a field parallel to a liquid crystal panel 12.

[0053] The 1st slider 96 is supported by the rail 94 movable in the direction of X with two or more guides 106, and both-way migration of between both the stages 52 and 54 is carried out with the 1st drive 100. The 2nd slider 98 carried out the delivery stage 52 and the inspection stage 54 in between, and is extended in parallel in the direction of X. Both the sliders 96 and 98 act as a movable carriage with a guide 106. However, the 2nd slider 98 may be omitted and a holder 102 may be arranged to the 1st slider 96.

[0054] Each 1st drive 100 was equipped with the endless belt 112 almost wound around the pulley 110 and both the pulleys 110 of the pair arranged pivotable around Z axis to the both ends of one rail base 92, and drive Hara 114 which rotates one pulley 110, and has connected the endless belt 112 with the 1st slider 96.

[0055] Each drive 100 delivers the 1st slider 96 from an inspection location, and is made to move it to a location by delivering the 1st slider 96, making it move to an inspection location from a location, and reversing a driving source 114, when a driving source 114 rotates normally. A timing belt can be used as an endless belt 112, and a timing pulley is used as a pulley 110 in this case.

[0056] Each holder 102 is supported by the condition that the inside turned the hollow with the 2nd drive 104 which has the hollow in which the edge of a liquid crystal panel is accepted, and corresponds at the 2nd slider 98, as shown in drawing 6 . Each holder 102 is maintained in the location corresponding to the notches 66 and 76 of the panel receptacle 58 and a work table 72. The holder 102 arranged at one 2nd slider 98 and the holder 102 arranged at the 2nd slider 98 of another side are making the hollow counter.

[0057] In the example of illustration, each 2nd drive 104 is equipped with a hydrostatic pressure cylinder style like a pneumatic cylinder as a driving source, and is attached in the 2nd slider 98 in the cylinder part, and has attached the holder 102 in rod section 104b with the implement with a group further.

[0058] As shown in drawing 6 , the implement with a group is arranged between the block 116 with a group attached in rod section 104b of the 2nd drive 104, the shaft 118 which is extended from block 116 to a Z direction, and receives a holder 102 possible [displacement] to a Z direction, and block 116 and a holder 102, and is equipped with the elastic body 120 which energizes a holder 102 in the direction which separates from rod section 104b.

[0059] A shaft 118 has the flange which prevents omission of a holder 102 at the near edge of block 116 and the contrary. Although an elastic body 120 is a compression coil spring arranged at the shaft 118 in the example of illustration, they may be other elastic bodies like rubber. Each holder 102 has formed the shock absorbing material 122 for preventing damaging a liquid crystal panel 12 in the KO character-like medial surface.

[0060] Next, the drawing 8 - drawing 15 reference is carried out, and actuation of the delivery stage 52 and a transport device 56 is explained.

[0061] Each transport device 56 is retreating the location which is moved to the delivery location and does not bar as opposed to the panel receptacle 58 for a holder 102 delivery of a liquid crystal panel 12 so that it may be shown at the time of standby, for example, drawing 8 . The delivery stage 52 expands both the cylinder style 60, and is making the location (height location) in the Z direction of the holder 102 of the 1st transport device (high side) 56 far from a pedestal 34, and the location in agreement carry out the variation rate of the panel receptacle 58.

[0062] In the condition of the above [the delivery stage 52 and a transport device 56], the liquid crystal panel 12 which should be inspected is delivered by the help, and is arranged at the panel receptacle 58 of a stage 52. at this time, fitting of the liquid crystal panel 12 is carried out to the space formed of the positioning section 64 -- the panel receptacle 58 -- receiving -- positioning ****.

[0063] Subsequently, the 1st transport device 56 operates and a holder 102 is moved by the 2nd drive 104 towards the inside in the direction in which it gets together. Thereby, a liquid crystal panel 12 is received in the hollow of the holder 102 of the 1st transport device 56 in the edge section of the direction of Y, as shown in drawing 9 . Since each holder 102 is accepted in the notch 66 of the panel receptacle 58 in that part at this time, the edge section of a liquid crystal panel 12 is accepted safely and certainly.

[0064] Subsequently, as shown in drawing 10 , the cylinder style 62 is contracted and the panel receptacle 58 descends to the location of the holder 102 of the 2nd transport device 56 near a pedestal 34 (low side) along with Z axis. Thereby, a liquid crystal panel 12 is passed to the 1st transport device 56, and is maintained by the condition of having inclined in the transport device 56.

[0065] Subsequently, it is moved towards an inspection location by the drive 100 with which the 1st transport device 56 corresponds. Thereby, as shown in drawing 11 , the 2nd transport device 56 delivers and it remains in a location. Moreover, a liquid crystal panel 12 is conveyed in the condition of having made the edge of the bottom contacting the inner side of the hollow of the lower holder 102. Thereby, a liquid crystal panel 12 is maintained by the condition of having carried out rough alignment.

[0066] By the work table 72 of the inspection stage 54 going up along with Z axis, and retreating in the location where the holder 102 of the 1st transport device 56 subsequently does not bar lighting inspection of a liquid crystal panel, the non-inspected liquid crystal panel conveyed by the 1st transport device 56 in the inspection location is passed to the inspection stage 54 from the 1st transport device 56, and lighting inspection is carried out so that it may explain later. The liquid crystal panel which inspection ended can be received in the holder 12 of the 1st transport device 56.

[0067] While the non-inspected liquid crystal panel was conveyed by the 1st transport device 56 in the inspection location and the liquid crystal panel is undergoing lighting inspection, it delivers, as the new non-inspected liquid crystal panel 12 shows drawing 11 , it is arranged at the panel receptacle 58 of a stage 52, as the holder 102 of the 2nd transport device 56 shows drawing 12 , it moves forward, and as the cylinder style 60 shows after that drawing 13 , it contracts. As the new liquid crystal panel 12 shows by this drawing 13 , it can receive in the 2nd transport device 56.

[0068] Subsequently, while a liquid crystal panel [finishing / inspection] delivers by the 1st transport device 56 and is returned to a location, a new liquid crystal panel is conveyed by the 2nd transport device 56 in an inspection location.

[0069] If a liquid crystal panel [finishing / inspection] delivers and it is conveyed in a location, the panel receptacle 58 will go up [first] along with Z axis in the height location of the holder 102 of the 1st transport device 56 by both the cylinder styles 60 and 62, and, subsequently the holder 102 of the 1st transport device 56 will retreat in the location which does not bar the delivery of a liquid crystal panel to the panel receptacle 58. Thereby, a liquid crystal panel [finishing / inspection] is passed to the panel receptacle 58.

[0070] Subsequently, a liquid crystal panel [finishing / the inspection on the panel receptacle 58] is removed from the panel receptacle 58, and a new non-inspected liquid crystal panel is arranged at the panel receptacle 58. Delivery of the liquid crystal panel at this time is also performed by the help.

[0071] The liquid crystal panel conveyed by the 2nd transport device 56 in the inspection location is passed to the inspection stage 54 like the above, undergoes lighting inspection, and is returned to the 2nd transport device 56 after that.

[0072] After that, conveyance of the liquid crystal panel [finishing / inspection] by one transport device and conveyance of the liquid crystal panel which is not inspected according to the transport device of another side synchronize, and are repeated, and lighting inspection of a liquid crystal panel is conducted between them.

[0073] As mentioned above, the time futility by migration of a transport device decreases remarkably by performing conveyance of the liquid crystal panel to the delivery stage by one transport device, and conveyance of the non-inspected liquid crystal panel to the inspection stage by the transport device of another side in parallel. In addition, removal of a liquid crystal panel [finishing / the inspection from the arrangement of a non-inspected liquid crystal panel and the panel receptacle 58 to the panel receptacle

58] may be performed mechanically.

[0074] Next, with reference to drawing 14 - drawing 17 , delivery of the liquid crystal panel between the inspection stage 54 and a transport device 56 is explained.

[0075] In the condition that the transport device 56 was moved to the inspection location, the non-inspected liquid crystal panel 12 is maintained more nearly up than the height location of the work table 72 in a Z direction by the transport device 56, as shown in drawing 14 .

[0076] In the above-mentioned condition, a work table 72 goes up along with Z axis by the Z stage of the inspection stage 54, and vacuum adsorption of the liquid crystal panel 12 is carried out until the panel receptacle side of a work table 72 becomes the height location of the holder 102 in a Z direction first, as shown in drawing 15 .

[0077] Subsequently, the holder 102 of a transport device 56 retreats in the location which does not bar lighting inspection, as shown in drawing 16 . Thereby, a liquid crystal panel 12 is completely passed to a work table 72.

[0078] Subsequently, the alignment mark formed in the liquid crystal panel 12 is photoed with the television camera 50 for alignment, and the variation rate of the work table 72 is carried out by each stage of the inspection stage 54 so that an alignment mark may serve as a predetermined coordinate location based on the output signal. Thereby, precision alignment of the liquid crystal panel 12 to the probe unit 40 is performed.

[0079] Subsequently, as shown in drawing 17 , a work table 72 goes up along with the Z-axis further by the Z stage of the inspection stage 54, and, thereby, the polar zone of a liquid crystal panel 12 is pressed by the probe 48 of the probe unit 40.

[0080] Subsequently, where the back light unit 80 is turned on, it energizes to a liquid crystal panel. Thereby, since a liquid crystal panel 12 is turned on by the predetermined pattern, the quality of a liquid crystal panel 12 is judged by checking the right or wrong of a lighting condition. The right or wrong of a lighting condition are checked by viewing of an operator.

[0081] After lighting inspection is completed, a work table 72 is lowered along with Z axis until the panel receptacle side of a work table 72 becomes the height location of the holder 102 in a Z direction, a holder 102 moves forward, a liquid crystal panel is wide opened from vacuum adsorption of a work table, and a work table descends along with Z axis further after that. Thereby, a liquid crystal panel 12 can be received in a holder 102.

[0082] As mentioned above, since a part of each holder 102 is accepted in the notch 76 formed in the work table 72 when a work table 72 and a holder 102 are moved relatively, the relative movement of a work table 72 and a holder 102 is not barred, but delivery of the liquid crystal panel between both is ensured.

[0083] Next, with reference to drawing 7 and drawing 18 , the detail of delivery of the alignment of the liquid crystal panel 12 on the work table 72 by the pusher device 84 and the liquid crystal panel 12 from a holder 102 to a work table 72 is explained.

[0084] First, it goes up until a work table 72 contacts a liquid crystal panel 12 in the condition that the liquid crystal panel 12 is maintained by the holder 102 more nearly up than the height location of the work table 72 in a Z direction, as shown in drawing 18 (A).

[0085] Subsequently, as shown in drawing 18 (A), each pusher device 84 operates, and the variation rate of the liquid crystal panel 12 is turned and carried out to a stopper 82. That is, a liquid crystal panel 12 is moved to the location shown in this drawing according to a two-dot chain line from the location shown in drawing 7 as a continuous line, and the two edges which the liquid crystal panel 12 adjoins are contacted by the stopper 82.

[0086] Even if the location of a liquid crystal panel displaces some the above-mentioned result at the time of conveyance of the liquid crystal panel by the transport device 56, and delivery of the liquid crystal panel from a holder 102 to a work table 72 at the time of delivery of the liquid crystal panel from the panel receptacle 58 of the delivery stage 54 to a holder 102, a liquid crystal panel 12 is carried out in alignment so that the alignment mark may enter in the visual field of the television camera 50 for alignment.

[0087] Subsequently, a work table 72 goes up along with Z axis further, as shown in drawing 18 (C). Thereby, a liquid crystal panel 12 can be received in a work table 72.

[0088] Subsequently, a work table 72 goes up in the location which the force of an elastic body 120 is resisted [location] and raises a holder 102 as shown in drawing 18 (D), and vacuum adsorption of the liquid crystal panel 12 is carried out in the condition at a work table 72. Thereby, a liquid crystal panel 12 is in the condition pressed by the work table 72, and since vacuum adsorption is carried out at a work table 72, it is held certainly at a work table 72.

[0089] Subsequently, as shown in drawing 18 (E), a work table 72 is slightly lowered along with Z axis, and it retreats to the location where a holder 102 does not become the hindrance of lighting inspection so that it may be shown subsequently to drawing 18 (F).

[0090] When passing a liquid crystal panel [finishing / inspection] to a holder 102 from a work table 72, actuation contrary to the above is performed in order of drawing 18 (F), (C), (B), and (A). In this case, when the pusher device 84 returns to the original condition, it originates in the top face of a work table 72 inclining, a liquid crystal panel displaces to a work table 72 and a holder 102, and a liquid crystal panel contacts the inner side of the hollow of the lower holder 102 in the edge of that bottom.

[0091] A holder 102 moves forward or retreats, where a liquid crystal panel 12 is contacted. However, the shock absorbing material 122 arranged in the hollow of each holder 102 prevents that an abrasion is formed in a liquid crystal panel 12 at this time.

[0092] In addition, get together and the 1st slider 96 is made to support both the 2nd slider 98 movable to phase detached building ****** (the direction of Y). By attaching a holder 102 in the 2nd slider 98, getting together with a drive, synchronizing to phase detached building ****** and moving both the 2nd slider 98 to it You may make it adjust according to the magnitude of the liquid crystal panel which may be made to carry out grasping and its discharge of the liquid crystal panel by the holder, and should inspect the maximum spacing of both the 2nd holder 98.

[0093] The pusher device 84 is continuing actuation until lighting inspection of a liquid crystal panel ends early, therefore the liquid crystal panel 12 is pressed by the stopper 82. For this reason, even if the rate of the area of the adsorption side by the slot 74 to the magnitude of a liquid crystal panel is small, a liquid crystal panel is maintained by stability, and even if it is a big liquid crystal panel, it can inspect correctly. Moreover, when a liquid crystal panel is pressed to a probe unit, the variation rate of the liquid crystal panel resulting from the thrust which acts on a liquid crystal panel, a unbalanced force, etc. is prevented.

[0094] In the transport device 130 shown in drawing 19 - drawing 21 , the 2nd slider 98 gets together in the 1st slider 96, and is arranged movable to phase detached building ******. The rail 132 extended in the direction of Y is formed in the top face of the 1st slider 96, and two or more guides 134 which were able to receive in the rail 132 possible [sliding] to the longitudinal direction are formed in the 2nd slider 98.

[0095] The 2nd slider 98 is supported by the 1st slider 96 in the shape of a cantilever with a rail 132 and a guide 134. For this reason, each 2nd slider 98 is further connected with the 1st slider 96 by the link 136 in two each which set spacing in the direction of X.

[0096] Each link 136 has the slot 138 extended to the longitudinal direction of the link concerned. Each link 136 is combined with the 1st slider 96 with the 2nd shaft 142 received in the slot 138 movable to the longitudinal direction while being combined with the 2nd slider 98 with the 1st shaft 140.

[0097] When both the 2nd slider 98 is detached most, as shown in drawing 19 , each link 136 is extended in the direction of X, and the 2nd shaft 142 is approaching the 1st shaft 140 most.

[0098] However, when the 2nd slider 98 is made to approach gradually, a link 136 comes to have an include angle to the direction of X, as by making it change gradually shows the location to a slot 138 to drawing 21 so that the 2nd shaft 142 may separate from the 1st shaft 140 gradually.

[0099] For this reason, a transport device 130 can adjust spacing of the 2nd slider 98 according to the magnitude of the liquid crystal panel 12 which should be inspected. The location of the 2nd slider 98 to the 1st slider 96 is maintainable possible [discharge] with two or more screw-thread members 144. Each **** member 144 is screwed with the 2nd slider 98, and is making the tip contact a rail 132.

[0100] Instead of making it combine with the 2nd slider 98 with the 1st shaft 140, and combining each link 136 with the 1st slider 96 with the 2nd shaft 142, it is made to combine with the 1st slider 96 with the 1st shaft 140, and association, now ** are good for the 2nd slider 98 by the 2nd shaft 142.

[0101] This invention is not limited to the above-mentioned example. For example, this invention is applicable also to the automatic test equipment which inspects a liquid crystal panel by computer based on the output signal using a proper image pick-up means not only like the visual inspection equipment inspected by viewing of an operator but a television camera. Moreover, the plunger device which used the solenoid may be used instead of the cylinder style as a drive.

[0102] This invention can be applied not only to the equipment which inspects a liquid crystal panel in the condition of having inclined again but to the equipment which inspects a liquid crystal panel in the horizontal or vertical condition, can be applied not only to a square liquid crystal panel but to the liquid crystal panel of other polygons, such as a hexagon and an octagon, and can be applied also to the equipment which inspects a liquid crystal panel further using the electrode prepared in the one polygonal side.

[Translation done.]

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved] The purpose of this invention is to lessen damage on the liquid crystal panel by the conveyance means as much as possible, and lessen time futility by migration of a conveyance means.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the front view showing one example of the test equipment concerning this invention.
[Drawing 2] It is the right side view showing one example of the part of the conveyance device in the test equipment of drawing 1 , and is drawing showing the part of a probe unit in a cross section.
[Drawing 3] It is the view Fig. which looked at the transport device in the test equipment of drawing 1 from the direction of 3-3 line in drawing 2 .
[Drawing 4] It is the top view showing one example of a work table.
[Drawing 5] It is the front view of the work table shown in drawing 4 .
[Drawing 6] It is drawing showing one example near the holder.
[Drawing 7] It is drawing for explaining the alignment of the liquid crystal panel on a work table.
[Drawing 8] It is the side elevation of a transport device showing the step of the beginning of a transport device.
[Drawing 9] It is the side elevation showing the step following drawing 8 of a transport device.
[Drawing 10] It is drawing showing the step following drawing 9 of a transport device.
[Drawing 11] It is drawing showing the step following drawing 10 of a transport device.
[Drawing 12] It is drawing showing the step following drawing 11 of a transport device.
[Drawing 13] It is drawing showing the step following drawing 12 of a transport device.
[Drawing 14] It is drawing for explaining delivery of the liquid crystal panel between a transport device and an inspection stage, and is drawing showing the first delivery step.
[Drawing 15] It is drawing showing the delivery step following drawing 14 .
[Drawing 16] It is drawing showing the delivery step following drawing 15 .
[Drawing 17] It is drawing showing the delivery step following drawing 16 .
[Drawing 18] It is drawing for explaining the relation between the transport device when passing a liquid crystal panel to an inspection stage from a transport device, and an inspection stage.
[Drawing 19] It is drawing showing other examples of a transport device.
[Drawing 20] It is a right side view at the transport device shown in drawing 19 .
[Drawing 21] It is the top view showing the condition of having made the 2nd slider in the transport device shown in drawing 9 approaching.
[Description of Notations]
10 Test Equipment
12 Liquid crystal panel.
30 Susceptor
40 Probe Unit
52 Delivery Stage
54 Inspection Stage
56 Transport Device
58 Panel Receptacle
60 62 Cylinder style (driving means for panel receptacles)

64 Positioning Section
66 76 Notch
72 Work Table
78 Edge Receptacle
80 Back Light Unit
82 Stopper
84 Pusher Device
86 Rolling Mechanism
88 Rocking Object
94 Rail
96 98 Slider
100 Drive for Sliders (1st Driving Means)
102 Holder
104 Drive for Holders (2nd Driving Means)
110 Pulley
112 Endless Belt
114 Driving Source
122 Shock Absorbing Material
132 Rail
134 Guide
136 Link
138 Slot
140,142 Shaft

[Translation done.]

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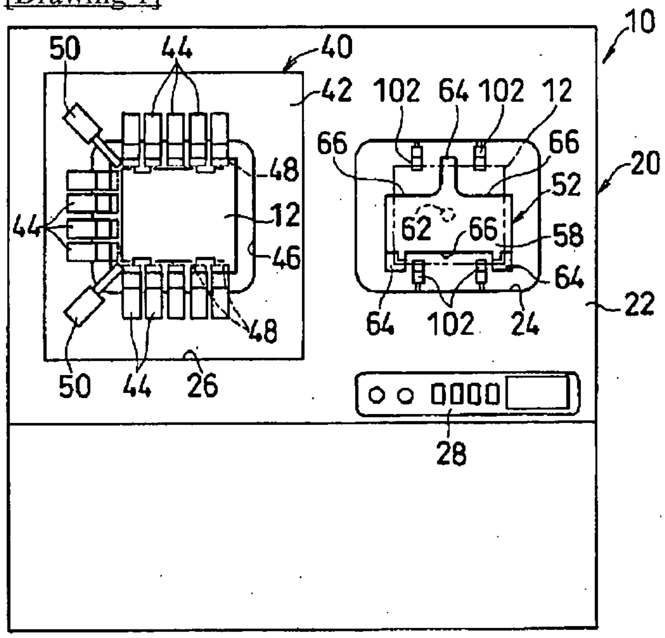
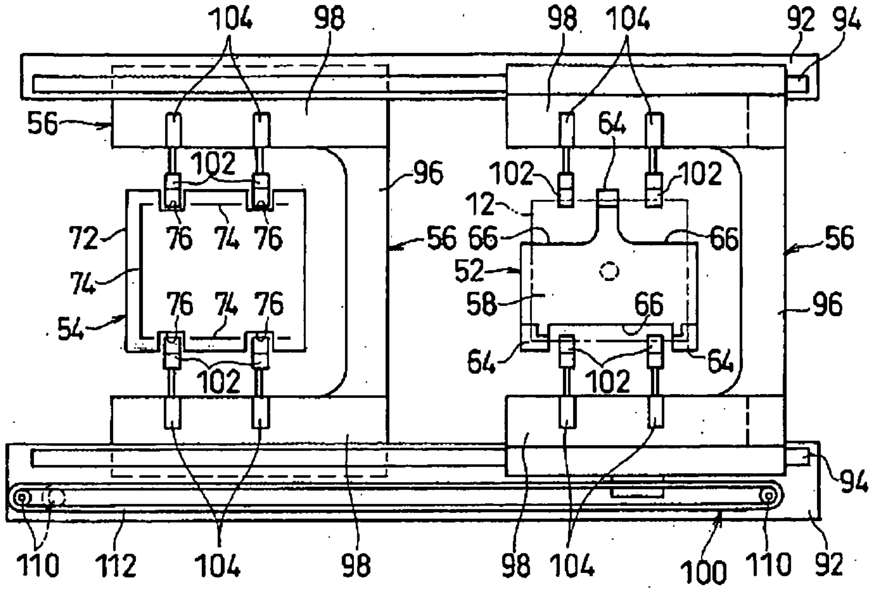
DRAWINGS

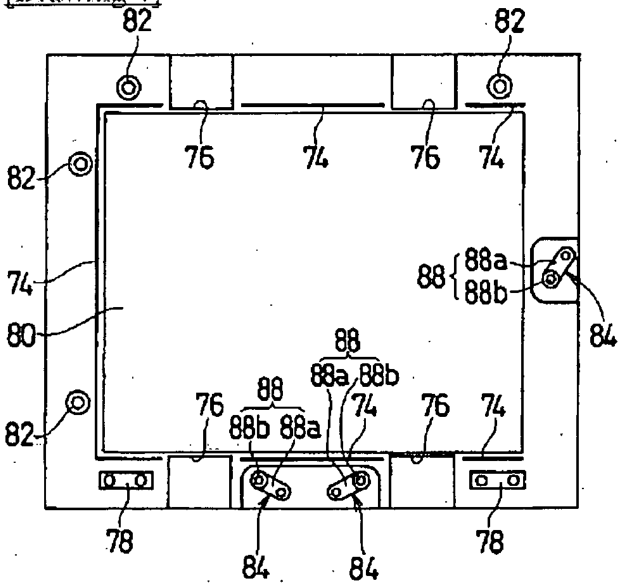
[Drawing 1]



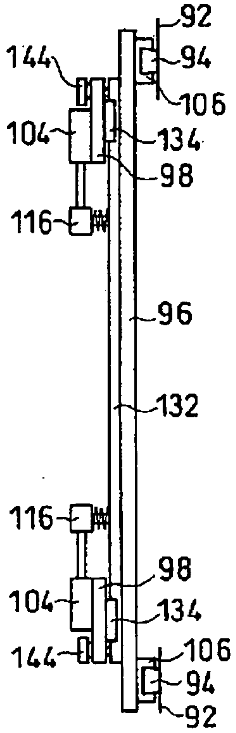
[Drawing 3]



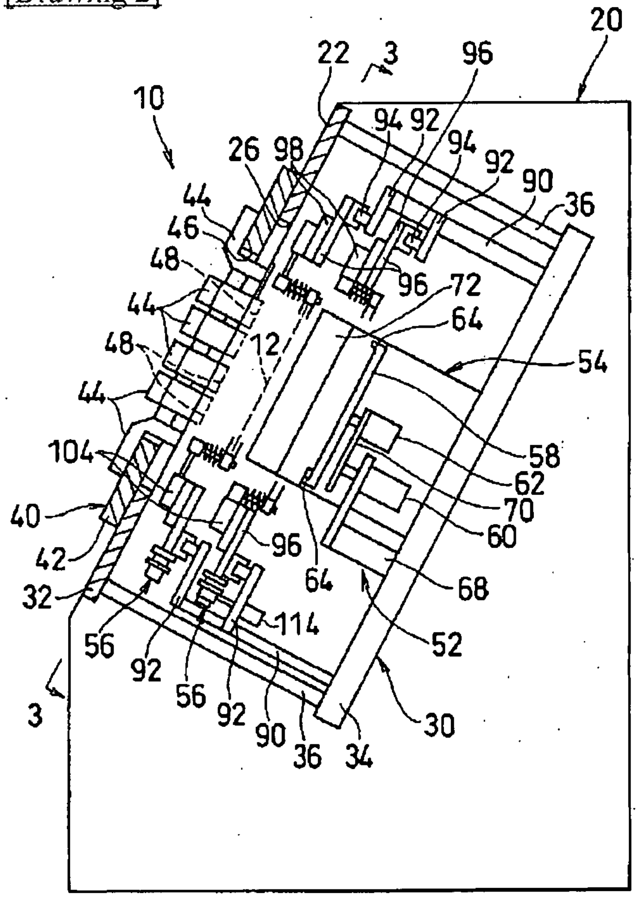
[Drawing 4]



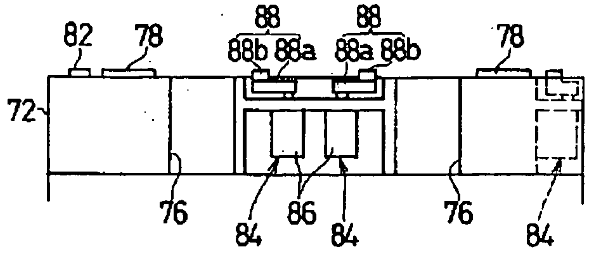
[Drawing 20]



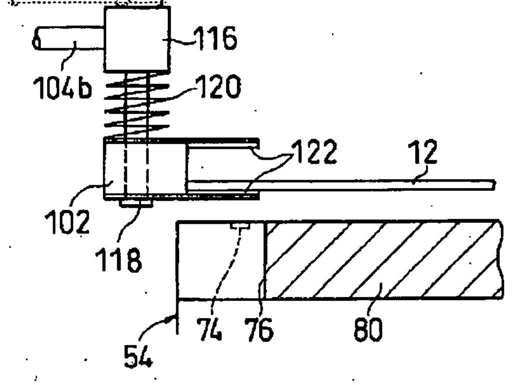
[Drawing 2]



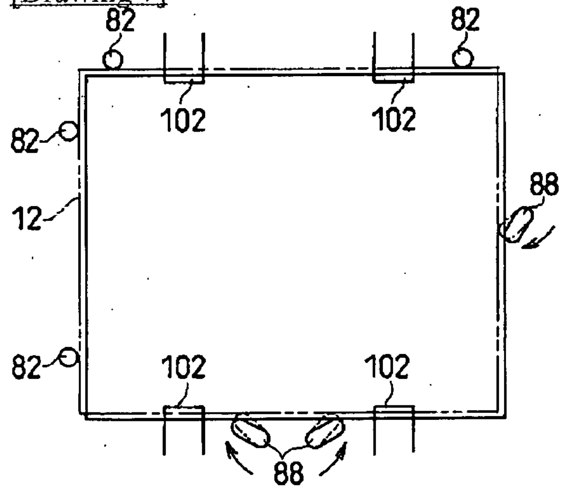
[Drawing 5]



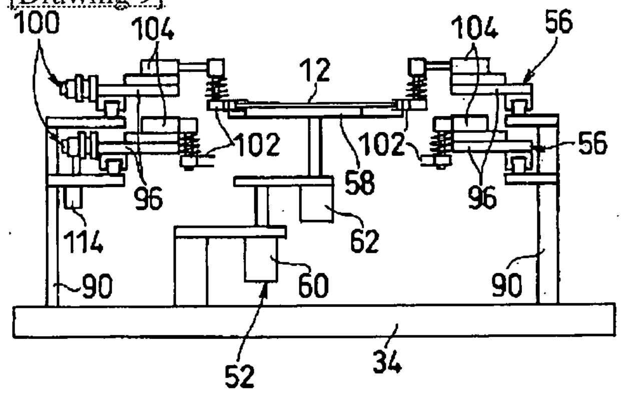
[Drawing 6]



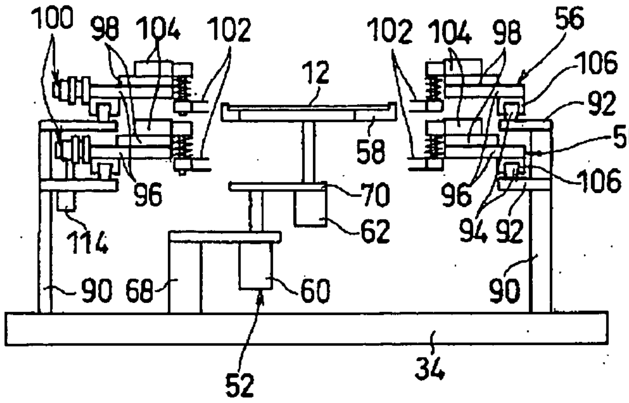
[Drawing 7]



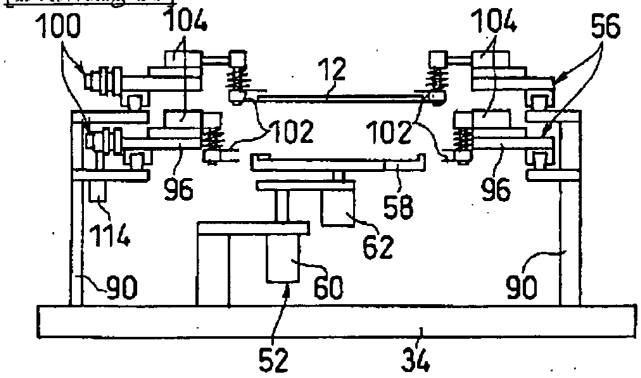
[Drawing 9]



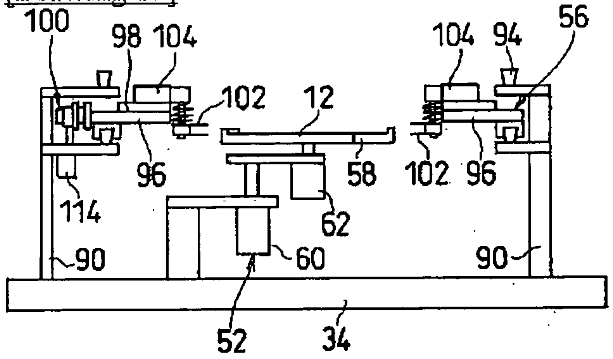
[Drawing 8]



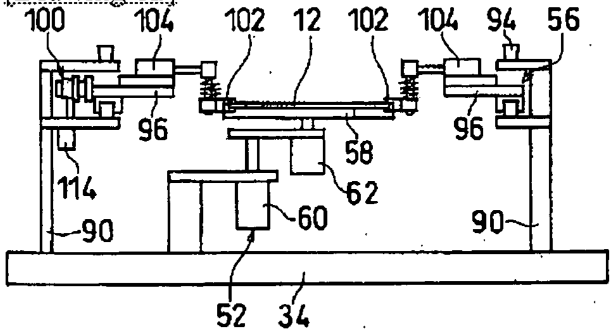
[Drawing 10]



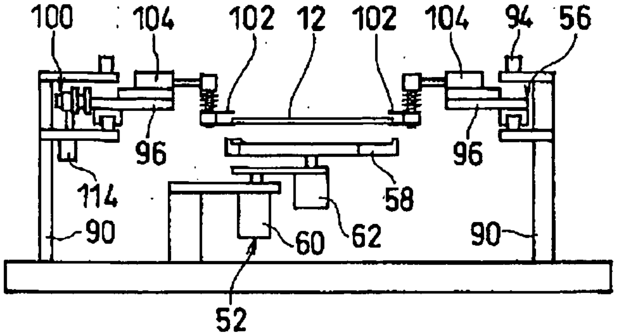
[Drawing 11]



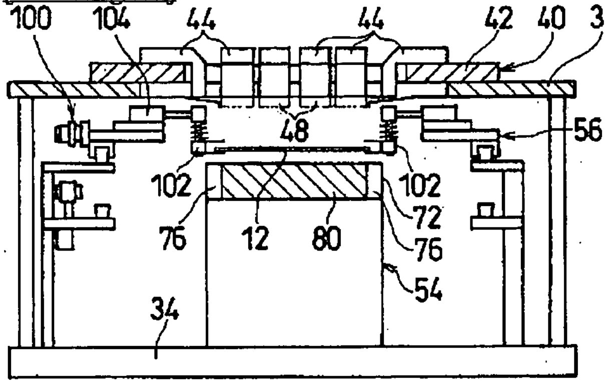
[Drawing 12]



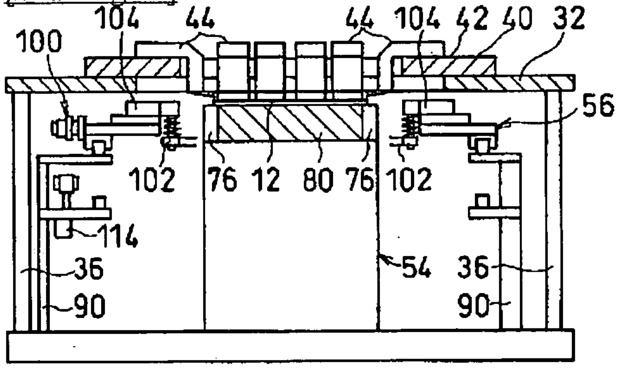
[Drawing 13]



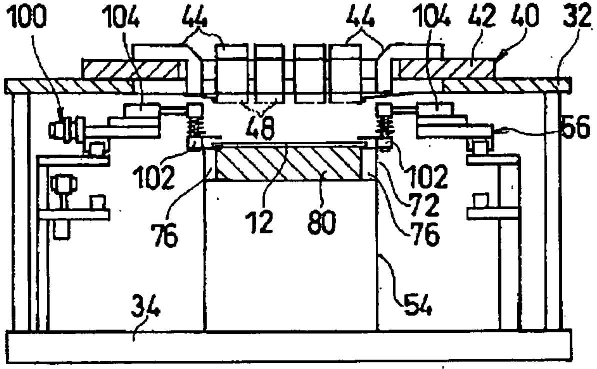
[Drawing 14]



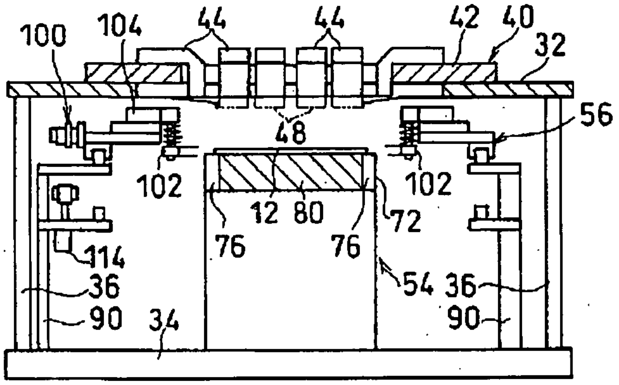
[Drawing 17]



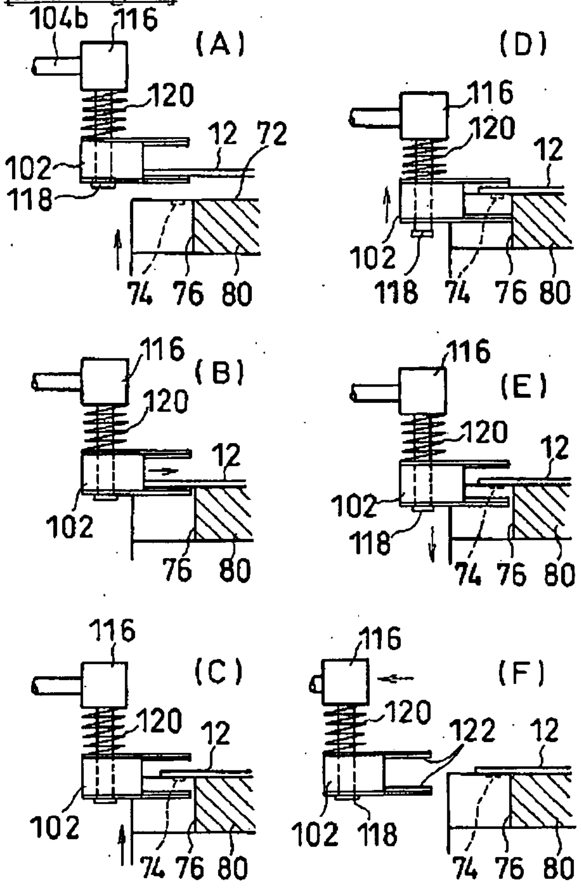
[Drawing 15]



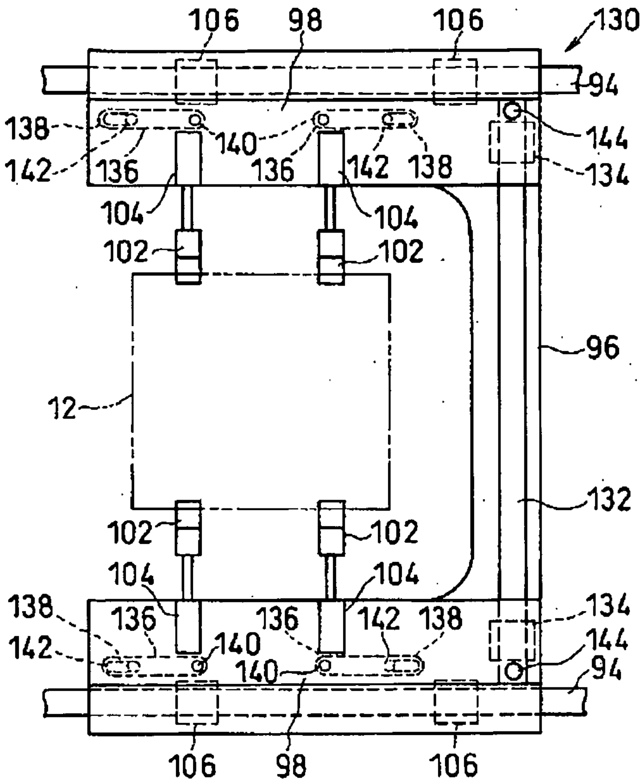
[Drawing 16]



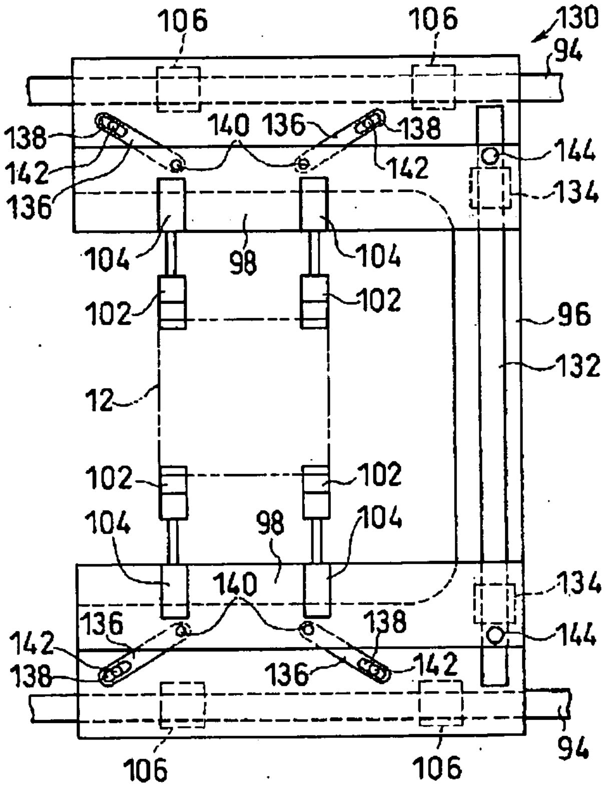
[Drawing 18]



[Drawing 19]



[Drawing 21]



[Translation done.]